

Title Impact of endogenous hydrogen peroxide on *Escherichia Coli* O157:H7 in fresh-cut lettuce

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Abstract

Escherichia coli O157:H7 is a serious human pathogen and cases of foodborne illness have been increasingly linked to minimally processed leafy greens. When lettuce tissues are damaged during harvesting and processing H₂O₂ is released as part of the wound response. The objective of this study was to evaluate the effects of endogenous H₂O₂ production on the survival of *E. coli* O157:H7 on fresh-cut packaged Romaine lettuce. Romaine lettuce was planted on autoclaved soil and grown in a growth chamber with a 14-hour photoperiod at 16 ±2.0°C for 60 d. In two independent trials, lettuce leaves (200g, n=3) were harvested and inoculated with 10⁶ CFU/g of *E. coli* O157:H7 strain BRMSID 1255. Lettuce leaves were processed as; 1] un-inoculated cut (~5mm strips across the midrib), 2] un-inoculated uncut, 3] cut, 4] uncut, and were packaged and stored in PD961EZ film bags at 4°C for 15 d. Samples (25 g) were taken on day 0, 1, 5,8, 13, 15 and *E. coli* O157:H7 populations were enumerated by standard dilution plating. Endogenous H₂O₂ production was measured on 6 evenly spaced spots (n=2) on lettuce leaves using the Bioxytec H₂O₂ - 560 Kit. Concentrations of H₂O₂ from cut leaf samples ranged from 0.32 to 1.47 mM with 0.845 ± 0.30 mM representing the average H₂O₂ produced from a bag of shredded lettuce. *E. coli* O157:H7 populations declined to 4.62 and 5.073 log₁₀ CFU/g lettuce on d 15 for uncut and cut treatments, respectively (P<0.05) indicating that survival was slightly better on cut leaves as compared to uncut. While H₂O₂ is the by-product of aerobic respiration and may be toxic to cells, data indicates that it is not produced at high enough levels to significantly affect large cell populations on cut lettuce. At lower bacterial levels, typical of product contamination, endogenous H₂O₂ may have a greater impact. Future studies are planned to address such issues.